limit in the north of Mwinilunga; several other species known from Kasaji, 90 km to the northwest in Zaire (Schouteden 1971), may in time be found in Zambia.

*Acknowledgements:* I am very grateful to the observers mentioned above for details of their records, and to those referees who have examined and criticised specimens and field descriptions. Mr. C. W. Benson has kindly commented on a draft of this paper.

References:

Benson, C. W. & Benson, F. M. 1977. *The Birds of Malawi.* Limbe: D. W. K. Macpherson (sponsor).

Benson, C. W., Brooke, R. K., Dowsett, R. J. & Irwin, M. P. S. 1970. Notes on the birds of Zambia. *Arnoldia (Rhod.)* 4(40): 59 pp.

— 1971. *The Birds of Zambia.* London: Collins.

Benson, C. W., Brooke, R. K. & Irwin, M. P. S. 1971. The Slatey Egret *Egretta vinaceigula* is a good species. *Bull. Brit. Orn. Cl.* 91: 131–133.

Brooke, R. K., Grobler, J. H., Irwin, M. P. S. & Steyn, P. 1972. A study of the migratory eagles *Aquila nipalensis* and *A. pomarina* (Aves: Accipitridae) in southern Africa, with comparative notes on other large raptors. *Occ. Pap. Natn. Mus. Rhod.* B5(2): 61–114.

Button, E. L. 1973. The Common Snipe *Gallinago gallinago* in Zambia. *Bull. Brit. Orn. Cl.* 93: 174.

Clark, A., Madden, S. T. & Milstein, P. le S. 1974. Black-tailed Godwit influx. *Bokmakierie* 26: 101.

Cottrell, J. A. 1938. Nesting of the Booted Eagle *Hieraaetus pennatus. Ostrich* 9: 97–98.

Dowsett, R. J. 1972. Is the bulbul *Phyllastrephus placidus* a good species? *Bull. Brit. Orn. Cl.* 92: 132–138.

— 1974. Some new bird distribution records for Malawi. *Society of Malawi Jnl.* 27(2): 32–36.

— & Dowsett-Lemaire, F. 1978. The voice of the Scarce Swift *Schoutedenapus myoptilus. Scopus* 2: 51–52.

— & Stjernstedt, R. 1973. The birds of the Mafinga Mountains. *The Puku* 7: 107–123.

Dowsett, R. J. in press a. Breeding and other observations on the Slaty Egret *Egretta vinaceigula. Bull. Brit. Orn. Cl.*

— in press b. Migration across the continent of Africa by coastal waders. *Le Gerfaut.*

Irwin, M. P. S. 1974. The Pintail *Anas acuta* in Rhodesia. *Bull. Brit. Orn. Cl.* 94: 56–57.

Martin, J., Martin, E. & Martin, R. 1978. Booted Eagles breeding in the north-eastern Cape. *Bokmakierie* 30: 48–51.

Schouteden, H. 1971. La Faune Ornithologique de la Province du Katanga. *Mus. Roy. l'Afr. Centr., Doc. Zool.* no. 17: 248 pp.

Skead, D. M. & Dean, W. R. J. 1977. Status of the Barberspan avifauna, 1971–75. *Ostrich* Supp. 12: 3–42.

Ulfstrand, S. & Alerstam, T. 1977. Bird communities of *Brachystegia* and *Acacia* woodlands in Zambia. *J. Orn.* 118: 156–174.

Vernon, C. J. 1971. Observations on *Egretta vinaceigula. Bull. Brit. Orn. Cl.* 91: 157–159.

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# Moult of the Long-billed Ringed Plover *Charadrius placidus*

*by R. C. Taylor*

*Received 27 February 1979*

The Long-billed Ringed Plover *Charadrius placidus* is a little studied eastern Palaearctic wader which breeds from the Middle Amur valley south through Manchuria and China to Japan, and possibly in Tibet (Vaurie 1965, 1972). Mainly it breeds inland on the shores of lakes and rivers, but has been reported breeding to a height of c 1000 m in Japan (Austin & Kuroda 1953).

In winter, the northern breeding populations move south and become partially synheimic with the resident southern populations, being recorded as far south as Vietnam (Waldash 1968) and Thailand (Jorgensen 1949), and as far west as Nepal (Ali & Ripley 1969).

The plumage of *C. placidus* is described fully by Kozlova (1961) but it has improperly been considered to resemble *C. hiaticula* (e.g. Dement'ev *et al.* 1969) though it differs in having bright cinnamon tips to the body feathers in

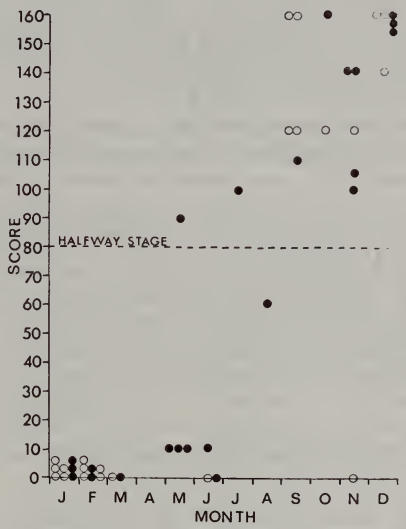


Fig. 1. Body moult scores of *Charadrius placidus*. Closed circles=southern resident birds; open circles=northern migratory birds. For method of scoring see text.

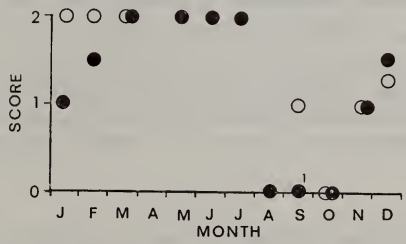


Fig. 2. Primary abrasion scores of *Charadrius placidus*. Symbols as in Fig. 1. For method of scoring see text.

fresh plumage Kozlova (1961) provides a qualitative, but incomplete, description of the moult. No quantitative descriptions of the moult have been published.

During a study of geographical variation in several *Charadrius* species (Taylor 1978) it was possible to investigate the timing of moult in *C. placidus*

using dated museum specimens, of which 45 adequately labelled individual skins were borrowed from the British Museum (Natural History) and the University of California (Berkeley). The extent of body moult was roughly quantified using a scoring system similar to that devised by Ferns (1978) for some Arctic waders. A 5-point scale (all old=0, beginning of moult=10, moderate moult=20, heavy moult=30, all new=40) was used to quantify the degree of moult in 4 regions of the body (coronal region of the capital tract, interscapular region of the dorsal tract, cervical and sternal regions of the ventral tract). Only a single bird in active primary moult was available, so a 3-point scale (new=0, moderately abraded=1, extensively abraded=2) was used to quantify the physical condition of the primaries in order to give some indication of the timing of primary moult.

The 45 specimens could be divided into 2 groups on the basis of their size and the date and locality of capture: 22 were considered to belong to northern migratory populations and 23 to southern sedentary populations. In view of geographical differences in the timing of moult observed in other species of waders (e.g. Holmes 1971) the 2 samples were analysed separately.

The pattern of body moult does not appear to be significantly different in the two groups (Fig. 1), although the paucity of specimens for the migratory group between March and September precludes any further comparison. There was no clear indication of a pre-alternate moult (terminology according to Humphrey & Parkes 1959); however, Kozlova (1961) reports a partial moult starting in January and ending in April, and although no active moult was observed in my series, the lack of abrasion of feathers in the loral, malar and cervical regions of specimens collected in January and February supports her observations.

The prebasic body moult begins in May and June and continues through to September, being generally complete by October in some birds, though continuing until December in others. Kozlova (1961) was unable to follow the timing of the prebasic moult due to lack of specimens, but considered that it began in early July, rather later than indicated by this study.

The prebasic moult of the primaries begins in August and continues until October in the southern populations. It may begin slightly later in the migratory populations (Fig. 2). One bird, considered to belong to the southern resident populations, in active primary moult, was collected in the Yangtse Valley, China, on 18 September. It had replaced all but the outer 3 primaries.

## DISCUSSION

The energy expenditure involved in feather replacement (King & Farner 1961) is such that moult is not usually simultaneous with periods of high energy expenditure such as reproduction and migration, and wading birds have adopted 3 strategies to help minimise any overlap. Holmes (1971) has shown that Arctic *Calidris* species either complete the prebasic moult whilst on, or near, the breeding grounds, or moult upon reaching their winter quarters, or beginning the moult on the breeding grounds arrest it during or prior to migration and complete it upon arrival in the winter quarters. Different populations of the same species adopt different strategies depending upon the conditions in the localities in which they breed and winter.

There is no evidence from this study to show that there is any difference between the northern and southern populations in the timing of the prebasic body moult, and data are insufficient for drawing any conclusions regarding the pre-alternate moult.

The present data suggest that the prebasic primary moult of the adults may begin slightly later, possibly by about one month, in the northern populations. From the small amount of data on the breeding biology available, it appears that the southern populations begin breeding in mid-March (Austin & Kuroda 1953), whilst the northern populations do not arrive on their breeding grounds until the end of March (Kozlova 1961). If the length of breeding season is the same in both populations (no data are available on incubation periods), it is possible that the southern populations will finish breeding about one month before the northern populations; and if moult only then ensues, the start of the primary moult would be expected also to be one month apart.

There is some evidence from the primary moult data (Fig. 2) that the duration of this moult may be shorter in the northern migratory populations. The primary feather abrasion scores indicate an extension of the moult into the winter period in the southern populations, whereas it may finish before arrival in the winter quarters for the northern populations. This is similar to the situation found in several other species of migratory waders, where the migrant populations generally have more rapid moults than resident populations (Pienkowski *et al.* 1976).

The prebasic body moult in the northern populations begins before the birds leave the breeding grounds, and its duration (August to December) is such that it almost certainly occurs simultaneously with migration, which is not unusual (Ferns 1978).

The timing and duration of moult in *C. placidus* is probably closely synchronized with the timing of other annual activities, but is probably different in the northern and southern populations. Considerably more field data are needed before firm conclusions can be reached.

*Acknowledgements:* I am grateful to Mr. I. C. J. Galbraith, British Museum (Natural History) and to Dr. N. K. Johnson, University of California, Berkeley, for the loan of specimens. My thanks are also due to Dr. W. G. Hale and the late Captain C. Pitman for commenting upon an earlier draft. The research was financed by a grant from the Science Research Council.

References:

Ali, S. & Ripley, S. D. 1969. *Handbook of the Birds of India and Pakistan,* Vol. 2. Oxford University Press.

Austin, O. L. & Kuroda, N. 1953. The birds of Japan, their status and distribution. *Bull. Mus. Comp. Zool. Harv.* 109: 277–637.

Dement'ev, G. P., Gladkov, N. A. & Spangenberg, E. P. 1969. *Birds of the Soviet Union.* Vol. 3. Israel Program for Scientific Translations: Jerusalem.

Ferns, P. N. 1978. The onset of prebasic body moult during the breeding season in some high-Arctic waders. *Bull. Brit. Orn. Cl.* 98: 118–122.

Holmes, R. T. 1971. Latitudinal differences in the breeding and molt schedules of Alaskan Red-backed Sandpipers. *Condor* 73: 93–99.

Humphrey, P. S. & Parkes, K. C. 1959. An approach to the study of molts and plumages. *Auk* 76: 1–31.

Jorgensen, A. 1949. Siams Vadefugle. IV. Charadriidae (Scolopacinae, Recurvirostrinae), Rostratulidae, Jacanidae; Supplement, Literatur. *Dansk Orn. Foren. Tidsskr.* 43: 261–279.
King, J. K. & Farner, D. S. 1961. Energy metabolism, thermoregulation and body temperature. *In* A. J. Marshall (ed.) *Biology and Comparative Physiology of Birds.* Vol. 2: 215–288. Academic Press: London.
Kozlova, E. V. 1961. *The Fauna of the U.S.S.R.* Vol. 1. Academy of Sciences U.S.S.R.: Moscow-Leningrad.
Pienkowski, M. W., Knight, P. J., Stanyard, D. J. & Argyle, F. D. 1976. The primary moult of waders on the Atlantic coast of Morocco. *Ibis.* 118: 347–365.
Taylor, R. C. 1978. Geographical variation in wading birds with reference to the Ringed Plover (*Charadrius hiaticula* L.) and related species. Unpubl. Ph.D. thesis, Liverpool Polytechnic.
Vaurie, C. 1965. *The Birds of the Palearctic Fauna. Non-passeriformes.* Witherby: London.
Vaurie, C. 1972. *Tibet and its Birds.* Witherby: London.
Waldash, P. 1968. *Birds of South Vietnam.* Charles E. Tuttle Co: Rutland, Vt.

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# Clutch sizes of Seychelles' endemic land birds

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*Received 1 March 1979*

This note combines recent published information on clutch sizes of Seychelles' endemic land birds with substantial new data, correcting erroneous statements that have occurred in the literature for several species, especially the Kestrel *Falco araea,* Magpie Robin *Copsychus sechellarum* and Paradise Flycatcher *Terpsiphone corvina,* while for several others little, if anything, has been published. New information presented here has been collected during 3 years field research (1975-78) on a number of Seychelles' land birds. Table 1 summarises the information presented below for each of the 11 endemic species.

Falco araea Loustau-Lalanne (1962) states that the Seychelles Kestrel lays a C/2 and Penny (1974) mentions C/1 or C/2. However, in 1975, 24 complete clutches were observed, 17 of 3 eggs and 7 of 2 eggs; a similar pattern was observed in 1976 but in 1977 there were more clutches of 2 than 3 (Watson in prep.).

Alectroenas pulcherrima Penny (1974) states that the clutch of the Blue Pigeon can be either one or 2, though he gives no authority for this statement. Vesey-Fitzgerald (1940) described a nest with one egg and this appears to be the only published record. During the 3 years 1975-77, 9 nests were located, 5 containing one egg and the remainder each held a single chick (pers. obs.). C/1, therefore, seems to be usual for this species.

Otus insularis The Scops Owl is the least known of all Seychelles' endemic birds and remains the only species whose nest has yet to be found. There is no published information on breeding but, during 1975-77 on Mahé, 3 different pairs of adults were observed with recently fledged young;